Water

P.E.I.'s MOST PRECIOUS RESOURCE

DUNK-WILMOT RIVERS COMPLEX

WATERSHED ACTIVITIES

SURFACE WATER PROGRAM

MARCH 1990

THE CANADA–PRINCE EDWARD ISLAND
WATER MANAGEMENT AGREEMENT

Environment Canada Environnement Canada

Prince Edward Island
Department of the Environment

DUNK-WILMOT RIVERS COMPLEX

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WATER MANAGEMENT AGREEMENT

Prepared by:

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SURFACE WATER PROGRAM

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PREFACE

This report is one of a series produced as a result of the Canada - Prince Edward Island Water Management Agreement. The work was performed as part of the Watershed Inventory Project under the Surface Water Program.

It was initiated in order to gain a better understanding of the activities which may impact on the quality and quantity of surface waters drained by the Bradshaw, Dunk and Wilmot Rivers.

The report is intended to be used in conjunction with the report entitled "Activities Affecting Surface Water Resources · A General Overview" and the book of "Dunk - Wilmot Rivers Watershed Complex Inventory Maps" which is maintained on file at Inland Waters Directorate, Environment Canada in Dartmouth, Nova Scotia. All references to maps in this report are to the atlas.

Mapping is performed on the 1:50,000 N.T.S. topographical series using the Universal Transverse Mercator (U.T.M.) grid system to the nearest one hundred (100) metres for point data. Non-point (polygon) data is also mapped where applicable. This data is available on diskette which is transferable to Geographical Information System (G.I.S.) thereby providing an opportunity to update and manipulate the data.

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TABLE OF CONTENTS

		Page
PREFACE		i
ACKNOWLEDGEMENTS		ii
TABLE OF CONTENTS		iii
LIST OF FIGURES		vi
LIST OF TABLES		vii
LIST OF MAPS		viii
LIST OF APPENDICES		ix
1.0	INTRODUCTION	1
2.0	GENERAL CHARACTERISTICS OF DUNK - WILMOT RIVERS WATERSHED COMPLEX	1
2.1	Description	1
2.2	Physiography	1
2.3	Soils	4
3.0	AGRICULTURAL OPERATIONS	4
3.1	Dairy Operations	4
3.2	Beef (Feedlot) Operations	4
3.3	Hog Operations	4
3.4	Poultry Operations	4
3.5	Stock Watering	6
3.6	Irrigation	6
3.7	Dead Stock Burial	6
3.8	Erosion Control Projects	6
4.0	FISH AND WILDLIFE RESOURCES	7
4.1	Angling Areas	7
4.2	Hunting Areas	7
4.3	Trapping Areas	7
4.4	Beaver Activity Areas	8
5.0	RECREATIONAL ACTIVITIES	8
5.1	Provincial Parks / Private Campgrounds	8
5.2	Swimming Areas	8
5.3	Boating / Canoeing Areas	9
5.4	Hiking / Cross-Country Skiing / Snowshoeing	9
5.5	Snowmobiling / Horseback Riding	9

		Page
5.6	Unplowed (Seasonal / Scenic Heritage) Roads	10
6.0	FISHERIES OPERATIONS	10
6.1	Licensed Commercial	10
6.2	Non-Licensed Commercial / Recreational	10
6.3	Finfish Aquaculture	11
7.0	INDUSTRIAL OPERATIONS	11
7.1	Stormwater Drainage	12
7.2	Sewage Lagoons	12
7.3	Food and Beverage Industry	12
7.3.1	Leaver Mushroom Company Limited	12
7.3.2	Mid-Isle Farms	12
7.4	Abandoned, Active and Unapproved Dump Sites	12
7.5	Excavation Pits	13
7.6	Salt / Sand Storage Locations	13
7.7	Snow Dumping Sites	14
8.0	ALTERATIONS OF NATURAL FEATURES OF WATERWAYS	14
8.1	Application Process and Requirements	14
8.2	Dam Inspections	15
8.3	Fishways	15
8.4	Road - Stream Intersections	15
8.5	Rail - Stream Intersections	15
9.0	WETLANDS	16
9.1	Freshwater Wetlands	16
9.2	Coastal Wetlands	16
9.3	Ducks Unlimited Canada Management Sites	17
10.0	ADDITIONAL ACTIVITIES WITHIN DUNK - WILMOT WATERSHED COMPLEX	17
10.1	Hydrometric Stations	17
11.0	ACTIVITIES AFFECTING SURFACE RESOURCES WITHIN DUNK - WILMOT RIVER WATERSHED COMPLEX	18
11.1	Sedimentation (Siltation) Sources	18
11.1.1	South Freetown I	20
11.1.2	South Freetown II	20
11.1.3	Newton	20
11.1.4	Rose Valley	20
11.1.5	Shamrock	20

			Page
	11.1.6	Stanchel I	20
	11.1.7	Stanchel II	21
	11.1.8	Wilmot Valley	21
11.2	Pollution Point Sources		21
	11.2.1	Ross Corner	21
	11.2.2	Glen Valley	21
11.3	Instream Obstructions		22
	11.3.1	Bedeque	22
	11.3.2	South Freetown I	22
	11.3.3	South Freetown II	22
	11.3.4	South Freetown III	22
	11.3.5	Breadalbane	22
	11.3.6	Emerald	22
	11.3.7	Elliots Pond	23
	11.3.8	Glen Valley	23
	11.3.9	Reads Corner I	23
	11.3.10	Reads Corner II	23
	11.3.11	Norboro	23
REFERENCES			24
APPENDIX			26

LIST OF FIGURES

Number	Title	Page
1.1	Dunk - Wilmot Watershed Complex	2
2.1	Comparison of the Physiography of Prince Edward Island and the Dunk - Wilmot Rivers Watershed Complex	3
3.1	Livestock Operations Located Within The Dunk - Wilmot Rivers Watershed Complex	5
6.1	Summerside Fish/Shellfish Landings (1987)	11

LIST OF TABLES

Number	Title	Page
3.1	Erosion Control Projects Located Within The Dunk - Wilmot Rivers Watershed Complex	7
9.1	Ducks Unlimited Management Sites Within The Dunk - Wilmot Rivers Watershed Complex	17
10.1	Land Use Characteristics of Hydrometric Stations Located Within Dunk - Wilmot Rivers Watershed Complex	19

LIST OF MAPS

Number	Title
11L/5	Scales Pond Provincial Park; The "Dunk River Greenbelt Trail"; Boating/Canoeing Launching Sites; Canoeing Routes; Oyster Fishing Areas; Shellfish Concentration Areas; Stormwater Drainage Outlets; Kinkora Sewage Lagoon; Leaver Mushroom Company Limited; Mid-Isle Farms; Active Dump Sites; Fishways; Rail-Stream Intersections; Sedimentation (Siltation) Sources -- South Freetown I, South Freetown II, Newton, Shamrock, Wilmot Valley; Pollution Point Source -- Ross Corner; and Instream Obstructions -- Bedeque, South Freetown I, South Freetown II, South Freetown III, Breadalbane, Emerald, Reads Corner I, Reads Corner II, Norboro.
11L/6	Dead Stock Burial Site; Week's Finfish Aqauculture Site, Sedimentation (Siltation) Sources -- Rose Valley, Stanchel I, Stanchel II; Pollution Point Source -- Glen Valley; and Instream Obstructions -- Elliots Pond, Glen Valley.
11L/5 and 11L/6	Livestock Operations; Angling, Hunting and Trapping Areas; Unplowed Roads in Winter; Abandoned, Active and Unapproved Dump Sites; Active Excavation Pits; Salt/Sand Storage Locations; Dam Locations; Major/Minor Road-Stream Intersections; 60+ Freshwater Wetlands; and Hydrometric Stations.

LIST OF APPENDICES

Number	Title
A	Description of Dams Located Within The Dunk - Wilmot Rivers Watershed Complex

1.0 INTRODUCTION

In November 1987 the Canada - Prince Edward Island Water Management Agreement was signed. The Agreement will focus upon several areas including groundwater contamination, surface water degradation and estuarine eutrophication. Of these, the Watershed Inventory Project, as part of the Surface Water Program, has been designed to identify current and future users of surface water and to document resource conflicts within twelve watersheds across the province. The Dunk - Wilmot Rivers Watershed Complex (Figure 1.1) was identified as an area of study for the project.

2.0 GENERAL CHARACTERISTICS OF DUNK - WILMOT RIVERS WATERSHED COMPLEX

2.1 Description

The Dunk - Wilmot Rivers Watershed Complex is located in the East Prince and West Queens area of P.E.I. The Dunk and Wilmot Rivers each drain a number of tributaries before emptying into Summerside Harbour. The Harbour, in turn, opens to Bedeque Bay on the Northumberland Strait.

The several glaciers which at one time covered Prince Edward Island have caused a gently undulating terrain across much of the province. Average elevation is less than sixty-one (61) metres above sea level. The Dunk - Wilmot Rivers Watershed Complex encompasses one of the flatter sections of the Island notwithstanding that the eastern part encompasses a hilly area where maximum elevations exceed one hundred thirty-seven (137) metres.

The Dunk - Wilmot area is largely rural with villages and hamlets scattered throughout. As is the case with the Island as a whole, the watershed is traversed by an extensive network of roads. Many of these roads are unpaved and are not kept open during the winter months.

Prince Edward Island is an agriculture-intensive province. Most of the land is suitable and used extensively for the production of potatoes (primary), grain and other food crops although livestock are also raised.

2.2 Physiography

When compared to the land use for the Island as a whole, the proportion of cleared land within the Dunk - Wilmot Rivers Watershed Complex is significant (Figure 2.1). Much of the land within the watershed has been cleared for agricultural use, especially growing potatoes. The estuaries of the Bradshaw, Dunk and Wilmot Rivers are important areas for growing oysters.

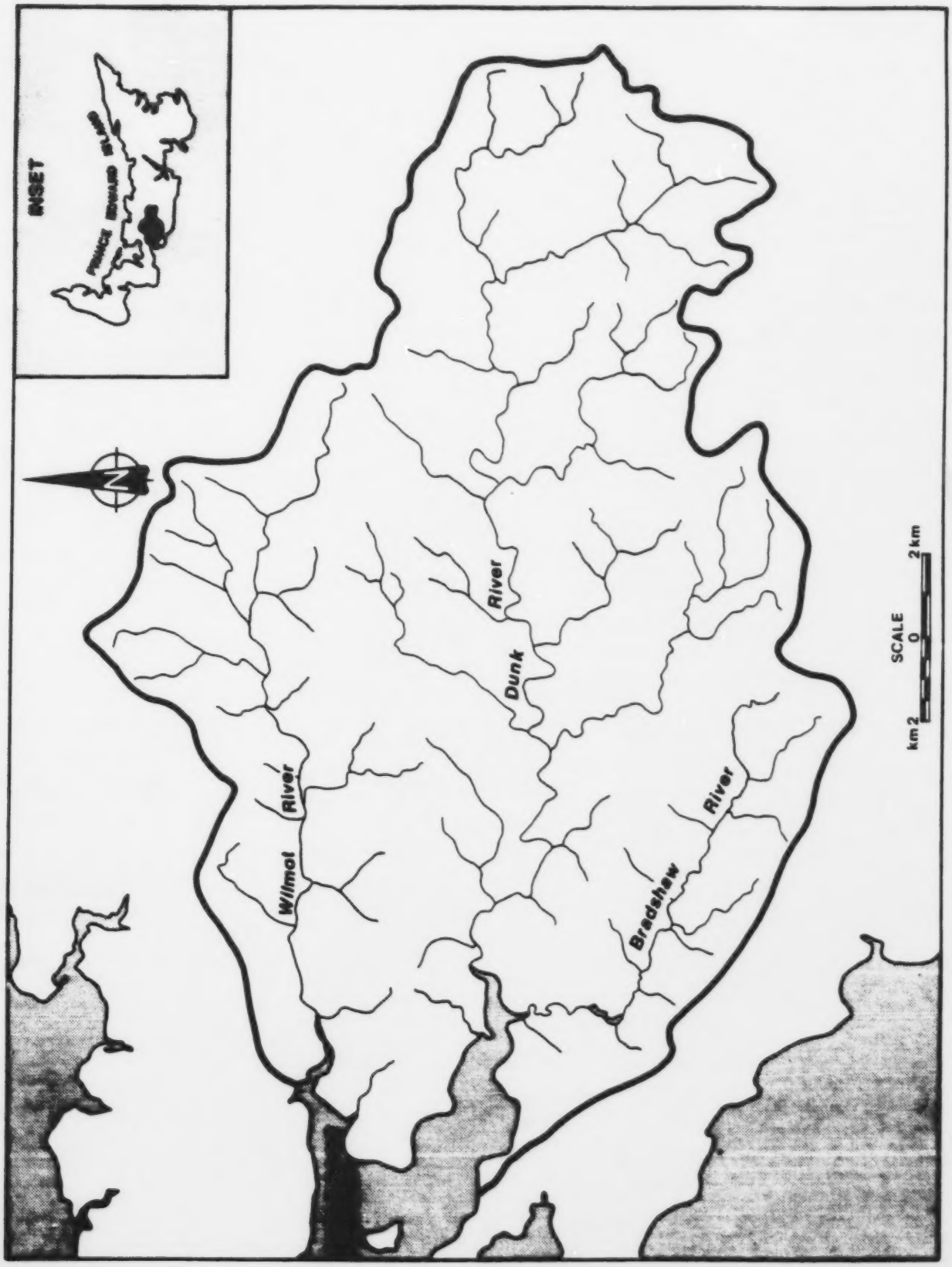

Figure 1.1 Dunk — Wilmot Rivers Watershed Complex

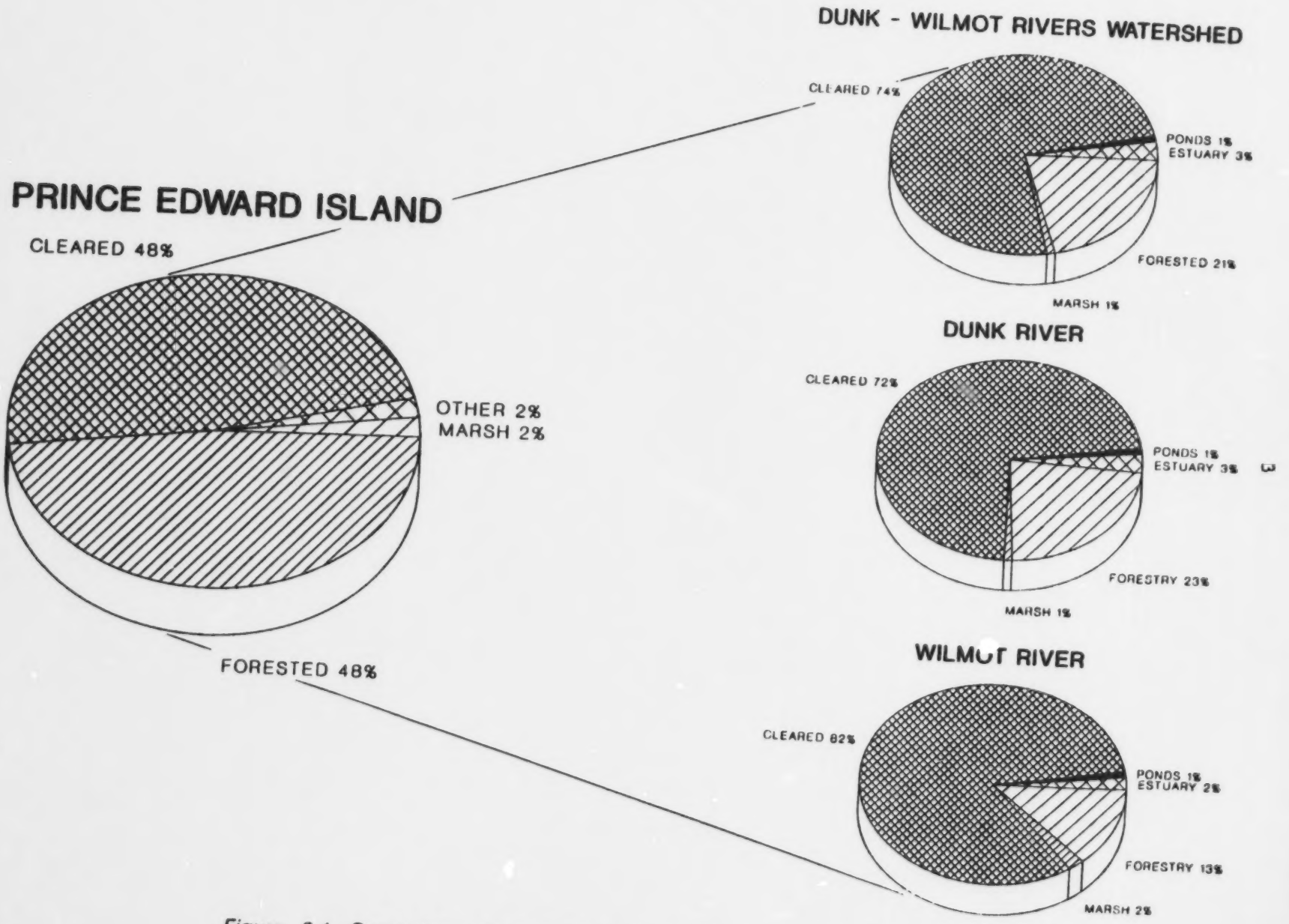

Figure 2.1 Comparison of the Physiography of Prince Edward Island and the Dunk — Wilmot Rivers Watershed Complex

The watershed drains a land base of three hundred and two square kilometres (302 km^2). The total length of the Dunk, Wilmot and Bradshaw Rivers and their tributaries is approximately two hundred and ninety-five kilometres (295 km).

2.3 Soils

Prince Edward Island's podzol soils, formed mainly from the weathering of sandstone and the deposition of glacial till, are generally stone-free, sandy and permeable. The Dunk - Wilmot Rivers Watershed Complex is composed of varying amounts of Class 0, 2S, 3S, 3T, 4T, 5^8_W, 5T and 7I soils. Approximately seventy-five percent (75%) of the soils are Class 2, ten percent (10%) Class 3, five percent (5%) Class 4, five percent (5%) Class 5 and less than five percent (5%) Class 7 (Canada Land Inventory, 1968).

3.0 AGRICULTURAL OPERATIONS

Agriculture forms a major part of Prince Edward Island's economy. The Dunk - Wilmot Rivers Watershed Complex's terrain is well-suited for crop production, therefore, large fields are predominant in the landscape. There are also a fair number of livestock operations located within the watershed (Maps 11L/5 and 11L/6).

3.1 Dairy Operations

There are thirty-nine (39) dairy operations (Figure 3.1) located in the watershed each containing thirty (30) or more head (30 milkers and 30 feeders) of cattle (Colwill, 1988).

3.2 Beef (Feedlot) Operations

Fifteen beef cattle farms (Figure 3.1) with fifty (50) or more head (50 cattle plus 50 feeders) are located within the Dunk - Wilmot Rivers Watershed Complex (Colwill, 1988).

3.3 Hog Operations

Sixteen hog operations (Figure 3.1) are located within the boundaries of the watershed. Each has an annual production of eight hundred (800) or more animals (Delaney, 1988). Since hogs are normally housed indoors the only threats to surface water quality are as a result of the improper storage and disposal of manure.

3.4 Poultry Operations

There are also two large scale poultry operations (Figure 3.1) located in the Watershed Complex (Colwill, 1988). One has been identified as a threat to surface water quality

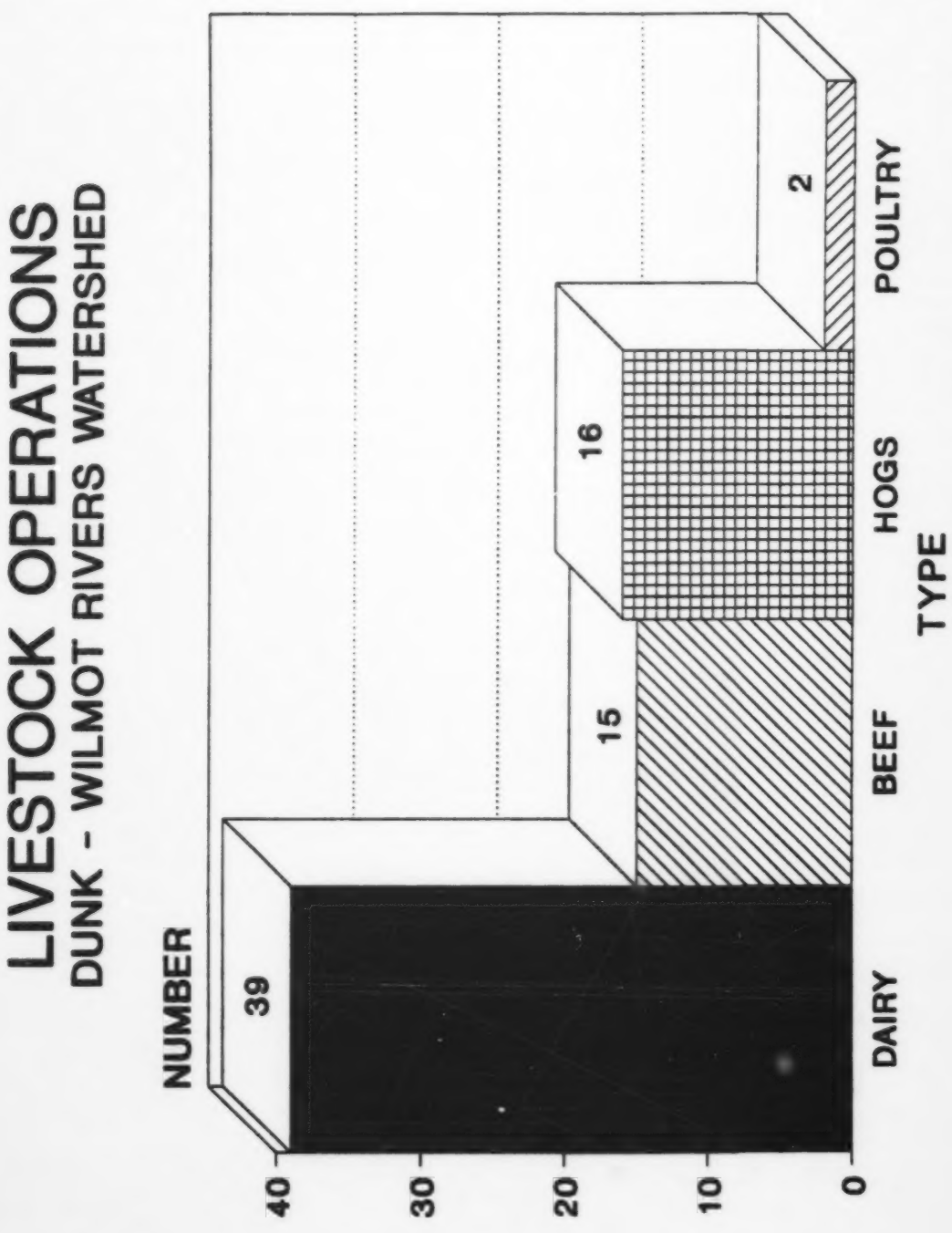

Figure 3.1 Livestock Operations Located Within The Dunk — Wilmot Rivers Watershed Complex

(refer to Section 11.2.1).

3.5 Stock Watering

Most livestock on Prince Edward Island are watered using groundwater piped into troughs (Murphy, S., 1988). However, several instances have been noted in which animals were observed drinking from streams traversing pastures (refer to Section 11.1). This leads not only to destabilization of the stream banks and siltation but to bacterial contamination of the water.

3.6 Irrigation

The Prince Edward Island Department of Agriculture does not keep specific records on irrigation occurring within the province. Water used for irrigation generally comes from a surface water source such as a farm pond or stream. In unusally dry years more farmers than usual have to irrigate their crops (Clough, 1988). This activity may have an effect on the amount of water available for users downstream of the withdrawal location. Therefore, a monitoring system should be put in place so as not to jeopardize the availability of the resource for fish, wildlife and other components.

3.7 Dead Stock Burial

There is one dead stock burial site in the watershed. It is located near Rose Valley (Map 11L/6). Farmers can pay a service fee to have their stock discarded at this approved site. They can also sell their dead animals to Maritime Pet Foods which is located in Hunter River (outside of the watershed) or they can dispose of the carcasses on their own land (which is the most likely scenario).

3.8 Erosion Control Projects

There are a total of eighty-nine (89) erosion control projects within the Dunk - Wilmot Rivers Watershed Complex. Of that, eighty-one (81) are tile drainage projects. These have enabled farmers to increase the productivity of low class agricultural lands (DeHaan, 1989).

Fifty-six (56) of the tile drainage systems were installed prior to the initiation of Agriculture Canada's Soil and Water Conservation and Management Program (Brown, 1988). The locations of these projects are unavailable. Since the Soil and Water Conservation and Management Program began in June 1984, there have been an additional twenty-five (25) systems (Pharo, 1988) installed (1987 figures).

There are also eight additional erosion control projects in the watershed (Table 3.1).

Table 3.1 Erosion Control Projects Located Within The Dunk — Wilmot Rivers Watershed Complex

TYPE	DUNK	WILMOT	TOTAL
Tile Drainage	19	6	81*
Ditching	4	1	5
Grassed Waterway	2	-	2
Berm	-	1	1
TOTALS	25	8	89

* Includes systems which were installed prior to the initiation of Agriculture Canada's Soil and Water Conservation and Management Program in June 1984.

4.0 FISH AND WILDLIFE RESOURCES

Fish and wildlife resources are important to both residents and tourists alike on Prince Edward Island in terms of the recreational and economic benefits they provide. Fish and wildlife on P.E.I. are dependent upon surface water resources either for primary habitat or as a source of drinking water.

4.1 Angling Areas

There are many angling sites located along the river banks within the Dunk - Wilmot Rivers Watershed Complex (Maps 11L/5 and 11L/6) including six listed in Angling on Prince Edward Island (P.E.I. Department of Tourism and Parks, 1988). Basically, the entire watershed is described as good for angling (Boswell, 1988).

4.2 Hunting Areas

The entire watershed is an excellent area for hunting waterfowl (Boswell, 1988). The large fields of food crops, especially grain, are utilized by waterfowl during their spring and fall migrations. The many hedgerows separating the large fields provide habitat for upland game animals such as pheasant, snowshoe hare and ruffed grouse. Other types of game include Hungarian partridge, snipe and woodcock. Since wildlife is known to be migratory, in response to habitat requirements and food availability, the hunting areas which have been delineated are not static from year-to-year.

4.3 Trapping Areas

As with hunting areas, the trapping areas (Maps 11L/5 and

11L/6) do not have consistent boundaries from year-to-year. They are dependent both upon the movement of animals and the preferences of trappers. The amount of trapping activity may also change annually depending upon the fur market conditions.

4.4 Beaver Activity Areas

There are no known active beaver dams within the Dunk - Wilmot Rivers Watershed Complex although they are slowly establishing themselves in adjacent areas to the east of the watershed (Dibblee, 1988).

5.0 RECREATIONAL ACTIVITIES

Surface water and some recreational activities go hand-in-hand (swimming and boating). Other activities (hiking and skiing) are often enjoyed in close proximity to streams and rivers. Similarly, major recreational facilities (provincial parks and campgrounds) are generally situated adjacent to Island surface water resources.

5.1 Provincial Parks / Private Campgrounds

There is one provincial park located within the Dunk - Wilmot Rivers Watershed Complex. Scales Pond Provincial Park (Map 11L/5) offers picnic and day-use facilities. A walking trail is also located in the park. A study proposed by the Kinkora Area Business Commission has been designed to evaluate ways in which other recreational and economic potentials of the park area may be utilized (Smith, 1988).

Recently, "The Dunk River Greenbelt Trail" has been established and two nature-oriented publications have been made available to the public. The booklets identify the flora and fauna of the greenbelt at particular points along the trail (Map 11L/5).

There are not any private camping areas located in the watershed.

5.2 Swimming Areas

Generally, people will swim where they desire. In P.E.I., many of the best swimming areas are coastal. This excludes most of the Dunk - Wilmot Rivers Watershed Complex.

The only organized swimming activities on the Island occur through the Canadian Red Cross Society which does not conduct swimming events in the Dunk - Wilmot area (MacLean, 1989). Scales Pond and the wider sections of the rivers would be areas most used by swimmers.

5.3 Boating / Canoeing Areas

Despite the attractiveness of both the Dunk River and Wilmot River for boating and canoeing, launching sites are limited. Most power boats enter the Dunk River or Wilmot River from Summerside Harbour via a public launching ramp located at the Summerside Yacht and Curling Club (Map 11L/5). Deeper draft sailing boats cannot enter the shallow rivers. The marina, with a capability for accommodating larger boats, is located just outside of the watershed boundaries.

The Prince Edward Island Recreational Canoeing Association (PEIRCA) is able to provide additional information on various canoeing routes (Map 11L/5) throughout the province but does not offer any organized trips (P.E.I. Department of Tourism and Parks, n.d.). Canoe rentals are available at Scales Pond which offers boating and canoeing opportunities. The Dunk River is suitable for canoeing from Whites Road to Ross Corner. The Wilmot River is a good area extending from Route #110 in Wilmot Valley to Reads Corner (Mills, 1988).

Boardsailing is gaining popularity on P.E.I. The mouths of the Dunk and Wilmot Rivers, which open to Summerside Harbour provide most of the windsurfing activity. During the winter, ice sailing is a popular sport on the rivers.

5.4 Hiking / Cross-Country Skiing / Snowshoeing

For the nature-buff or recreational enthusiast, a good method in which to see an area is on foot, either by hiking, cross-country skiing or snowshoeing. In this way, people can go at their own pace, perhaps photographing what catches their eye or just enjoying the great outdoors.

There are no organized hiking or cross-country ski trails although trails on private lands and rail lines are used by members of the local communities. The recently established "Dunk River Greenbelt Trail" is an interpretive hiking route located in Scales Pond Provincial Park.

Snowshoeing may be undertaken anywhere throughout the watershed although the areas utilized for hiking and cross-country skiing most likely have the highest use for snowshoers as well.

5.5 Snowmobiling / Horseback Riding

There are not any snowmobiling clubs and therefore no organized excursions. Snowmobilers are often observed riding through fields and along woods' and seasonal roads.

There are no commercial horseback riding operations located in the watershed. However, there have been horses

noted in several of the pastures and it has been assumed that recreational trail riding does occur on a limited scale.

5.6 Unplowed (Seasonal / Scenic Heritage) Roads

Many local and unpaved roads are not kept open for vehicular traffic during the winter months (Maps 11L/5 and 11L/6). Their relative abundance provides additional venues for winter recreational activities such as cross-country skiing, snowshoeing and snowmobiling. Often not heavily travelled, even during the warmer months they also further supply recreational opportunities for hiking, cycling and horseback riding.

There have not been any roads designated as Scenic Heritage Roads within the watershed although one, pending its ownership status is being considered (Horne et. al. 1988).

6.0 FISHERIES OPERATIONS

The fisheries industry is very important to the economy of Prince Edward Island. All of the province's major watersheds have an estuarial component thereby supporting a fishery to some extent. Any finfish and shellfish harvesting can be placed into three general categories, namely; licensed commercial, non-licensed commercial and recreational and finfish aquaculture.

6.1 Licensed Commercial

The Dunk River and Wilmot River estuaries are classed as public fishing domain. As such, there are no suspended or ground shellfish leases. Fishermen can remove oysters throughout the zone (Small, 1988).

It has been estimated that as much as seventy percent (70%) of the Island's annual oyster production comes from this area (Morrison, 1988). This high figure may not appear in figures of landings as these "spring fishery" oysters are often transferred to other locations such as Malpeque Bay, New London Bay, West River or Hillsborough River for flushing (cleaning). They are most often recorded as landings in the second area. The primary oyster areas of concentration in the watershed are indicated on Map 11L/5. Some quahogs and soft-shelled clams are also harvested (Small, 1988). Additionally box nets are used to trap smelt (season extends from October 15 to February) and gaspereau (season runs May 1 to June 30) during their annual migrations. Catches are regulated by season and are monitored by Department of Fisheries and Oceans personnel (Bernard, 1988).

6.2 Non-Licensed Commercial / Recreational

There is no recreational harvest of shellfish from the

Dunk - Wilmot Rivers Watershed Complex because the estuaries are closed due to bacterial contamination (Bernard, 1988). Smelt and mackerel are taken at the mouths of the rivers but only on a recreational basis.

In 1987 the value of the fish and shellfish landed at Summerside was approximately one million three hundred thousand (1,300,000) dollars (Figure 6.1). The areas of greatest shellfish concentration within the Dunk River and Wilmot River estuaries have been identified (Map 11L/5) (Blackadar, 1988).

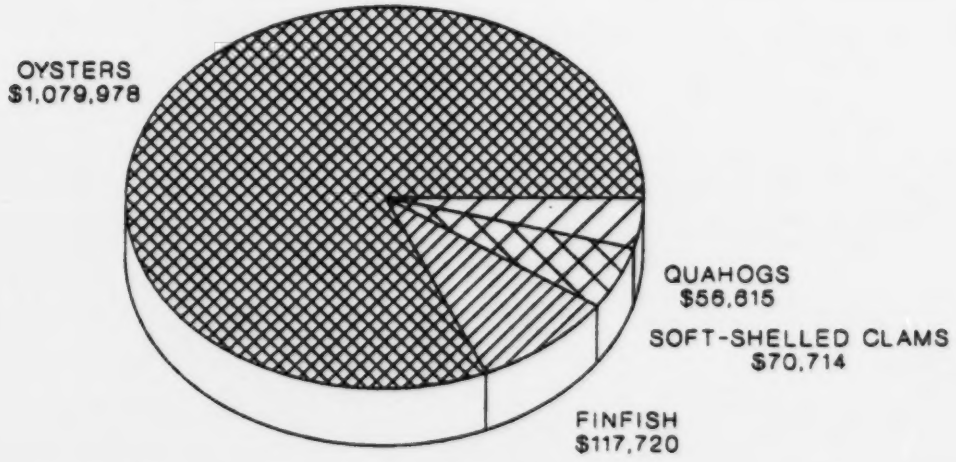

Figure 6.1 Summerside Fish/Shellfish Landings (1987)

6.3 Finfish Aquaculture

There is one finfish aquaculture site in the watershed. Week's Fish Farm is located adjacent to Elliots Pond (Map 11L/6). It is a small operation and, most likely, has very little effect on the amount of water available within Elliots Pond (Murphy, L., 1989). Another fish farm, which was to be located on the same pond, initially received approval to withdraw water but did not begin production.

7.0 INDUSTRIAL OPERATIONS

Many of the industrial operations on Prince Edward Island have an effect on surface water resources in one way or another. Some discharge both treated and untreated wastes directly into streams and rivers while others allow for the seepage of pollutants to surface or groundwater sources. Some industrial operations require a surface water source for use in their processes.

7.1 Stormwater Drainage

A small stormwater drainage system located in Kinkora discharges into a hollow in a field (Map 11L/5) with the effluent eventually seeping into the ground without being monitored.

In Central Bedeque, a storm sewer outlet (Map 11L/5) drains into the Bradshaw River, a major tributary of the Dunk River, without being monitored or receiving treatment.

7.2 Sewage Lagoons

The only sewage holding lagoon is located in Kinkora (Map 11L/5). It serves the equivalent of 105 single family units (Hogan, 1988). The discharge seeps into an unnamed tributary of the Dunk River (McCarvel, 1988).

7.3 Food and Beverage Industry

The Dunk - Wilmot Rivers Watershed Complex has two food operations located within its boundaries.

7.3.1 Leaver Mushroom Company Limited

The Leaver Mushroom Company Limited, located in Ross Corner (Map 11L/5), utilizes horse manure obtained from nearby farms and racetracks. It is stored on a cement slab near the production unit. The manure is then transferred to one of the "growing rooms" which are refilled at the rate of about one per week (North, 1988). The growing substrate for the mushrooms, which weighs about thirty (30) tonnes per room, consists of horse manure and peat moss. When finished the used mixture is sold to local farmers who then spread it on their fields.

7.3.2 Mid-Isle Farms

Mid-Isle Farms, located in Albany (Map 11L/5), washes and packs baking potatoes for the fresh market. The used washwater is collected into a holding lagoon which is located behind the plant. This water has a high bacterial and nutrient content. Lagoon discharge and seepage enter the upper reaches of the Bradshaw River.

7.4 Abandoned, Active and Unapproved Dump Sites

During 1982-83, the P.E.I. Department of Community and Cultural Affairs, in conjunction with Environment Canada, performed a study in which abandoned, active and unapproved waste disposal sites on Prince Edward Island were located and inspected (Water Resources Section, 1983). Of prime concern during this inventory was the potential for groundwater contamination. Thirty-one (31) sites were identified within

the Dunk - Wilmot Rivers Watershed Complex (Maps 11L/5 and 11L/6).

As part of the inventory, a scoring system was used to rate and priorize (Priority I, II and III) each site on the basis of actual and potential environmental effects. Priority I sites were rated as being most hazardous to the environment; Priority II dumps were less hazardous; while Priority III sites were generally very small discriminate sites which were not considered to be environmentally hazardous. Evaluation revealed one Priority I, eight Priority II and nineteen Priority III sites.

The Air and Solid Wastes Branch, P.E.I. Department of Community and Cultural Affairs, has identified three active dumps: two lanfills located near Kinkora and Central Bedeque and one container site near Rose Valley (Map 11L/5), (Reeves, 1988).

There is no established program for hazardous waste disposal on Prince Edward Island (Curley, K., 1988). However, the Air and Solid Wastes Branch cooperates with their Federal counterparts in controlling toxic waste disposal. For example, asbestos, which has been removed from buildings is double-bagged and dumped at landfill sites. Agricultural pesticides are sometimes left at dumpsites illegally. Since it is difficult to regulate such practices, remnant chemicals could become a potential hazard to both surface and groundwater resources.

The only other major form of toxic wastes on P.E.I. are polychlorinated biphenols (PCB's). As these compounds do not break down under normal conditions, they must be stored until they can be transported to a proper disposal site (located off-Island). There are no registered PCB users or PCB storage sites within the watershed (Guardian - Patriot, 1988).

7.5 Excavation Pits

Scattered throughout Prince Edward Island are numerous excavation pits used for the private and commercial removal of sandstone, and to lesser amounts, gravel and sand. There are six registered active excavation pits (Maps 11L/5 and 11L/6) in the watershed. Records are not kept concerning the quantity of material removed from the individual pits and there are other pits for which permits have not been obtained. As well, records are not maintained concerning the number of non-operational or abandoned pits (Murphy, C., 1988).

7.6 Salt / Sand Storage Locations

The P.E.I. Department of Transportation and Public Works maintains a number of salt/sand storage areas across the

Island. At these temporary sites, the salt and sand is stored directly on the ground with little or no site preparation. Often, the locations of these secondary sites change thereby yielding both abandoned and active sites. Two active (Breadalbane and Springton II) and two abandoned (Springton I and Searltown) locations have been identified (Maps 11L/5 and 11L/6).

7.7 Snow Dumping Sites

There are not any major problems with snow accumulation on roads and streets because of the small size of the communities. Snow is plowed either into the ditch or the nearest open field or lot. The effects of this activity on surface water quality are minimal.

8.0 ALTERATIONS OF NATURAL FEATURES OF WATERWAYS

Individuals or groups wishing to alter a water system directly or indirectly to improve its recreational potential, to provide a reservoir for agricultural purposes or fire protection, or to construct a stream crossing, must seek approval from the P.E.I. Department of Community and Cultural Affairs (Environmental Protection Act, Sections 10 and 11).

8.1 Application Process and Requirements

Alteration applications are subject to government control under the P.E.I. Environmental Protection Act (Section 10) and the Canada Fisheries Act (Chapter F-14, Section 20). Before requests are given final approval by the Head of the Watercourse Alteration Advisory Committee, they are reviewed by several Federal/Provincial Government and private agencies. Once approval is granted, inspections are carried out to ensure that the recommendations of the Committee are being followed.

Application considerations include the following criteria: the well-being of the fisheries resource; possible changes in water quality; stream-side cutting leading to loss of essential food and cover for wildlife; and the effects of the alteration on other types of wildlife.

Types of alterations include; installation of dams and fishways, bypass pond construction, roadway culvert installation, rock gabion installation and the infilling of marshes. Infilling applications are rejected since it results in a loss of wildlife habitat.

Since P.E.I. soils are highly susceptible to erosion, proponents who alter waterways must undertake erosion control measures throughout the construction process.

8.2 Dam Inspections

Most of the thirty (30) dams in the watershed were inspected (Maps 11L/5 and 11L6). There are nineteen in the Dunk River subwatershed and eleven in the Wilmot River subwatershed. Some were found to constitute a barrier to fish passage (refer to Section 11.3). The reasons for this were due either to the design of the dams, breakdown of the structures or debris within the waterways. Other dams were breached (washed out). Full descriptions of the dams are contained in Appendix A.

There are, in some cases, repairs made to design flaws of roadway culverts which then permit the passage of fish through the structures. This involves the installation of baffles which then allows for decreased flows and increased depths within the culverts.

8.3 Fishways

On Prince Edward Island whenever an alteration is made to a waterway, the continued passage of fish must be ensured [Canada Fisheries Act, Chapter F-14, Section 20, (1)]. This involves, in some cases, the construction of a fishway. Various fishway designs are available with the type constructed dependent upon the species of fish to be passed and the water level fluctuations within the impoundment.

Four fishways were identified and field checked (Map 11L/5). All were pool-and-weir design (ranging from seven to sixteen steps) and were determined to be in good condition.

8.4 Road - Stream Intersections

The P.E.I. Department of Transportation and Public Works maintains a reference map which provides an up-to-date record of all major highway structures, that is, those over 1.2 metres in diameter, within the province. The Dunk - Wilmot Rivers Watershed Complex contains sixty (60) such structures (Maps 11L/5 and 11L/6).

The Watershed Inventory Project also identified ninety-nine (99) additional road - stream intersections which, due to their smaller size, are not kept on file at the Department of Transportation and Public Works (Maps 11L/5 and 11L/6). These crossings were located via 1:50,000 N.T.S. maps but not all have were field checked.

8.5 Railway - Stream Intersections

Earlier this century, railroads on Prince Edward Island were a vital component in the transportation of goods across the Island. However, due to increased rail costs and more efficient trucking methods, its importance is rapidly

decreasing. Therefore, all lines across the province were abandoned effective January 1990.

Once a line is abandoned, CN Real Estate contracts out for the removal of the ties and rails. Crossing structures are not usually removed since they are often more useful if left in place.

There are nineteen (19) major railway - stream intersections within the watershed (Map 11L/5) constructed of an assortment of materials (wood, brick, iron and concrete). Future barriers to fish may result if regular inspections and maintenance of the crossings are discontinued.

9.0 WETLANDS

Wetlands include salt marshes, intertidal flats, bogs, freshwater marshes, swamps and ponds. They are important for many reasons (Canadian Wildlife Service, n.d.):

1. as wildlife habitat;
2. act as natural filters;
3. bind pollutants thereby slowing the eutrophication process;
4. reduce flooding by acting as reservoirs; and
5. recharge the groundwater supplies.

During 1983 - 84 wetlands over 0.25 hectares on Prince Edward Island were inventoried. The objective of the program was to provide information on the classification, size, distribution and wildlife value of P.E.I. wetlands.

9.1 Freshwater Wetlands

All freshwater wetlands were identified during the Inventory and were given a wildlife value based on a wide array of parameters. The wetlands received a score between 36 and 108 with a score of 60+ indicating generally more productive areas.

Twenty-seven (27) wetlands with a score of 60+ were delineated in the (Maps 11L/5 and 11L/6) including sixteen in the Dunk River subwatershed and eleven in the Wilmot River subwatershed (Canadian Wildlife Service, n.d.).

9.2 Coastal Wetlands

Coastal wetlands were classified and scored as coastal units during the wetland inventory. The coastal unit score was calculated using the total of the scores from six component types of wetlands along with five additional factors. Added to that was a value for the disturbance status of the unit. The total coastal unit score indicated its productivity and provides a measure of its importance to

wildlife. The scores ranged from 10 to 1500 points and were indicated as the sum of all wetlands within the unit.

There are not any wetlands which can be classified as coastal within the Dunk - Wilmot Rivers Watershed Complex (Canadian Wildlife Service, n.d.).

9.3 Ducks Unlimited Canada Management Sites

Ducks Unlimited Canada is active on Prince Edward Island in the enhancement and management of wildlife habitat. Several types of management techniques are employed for this purpose. Installation of water control devices such as drop inlets and stoplog control structures allow for the creation of ponds and the regulation of water levels in order to maintain optimal habitat conditions. Fishways are usually installed with the water level control structures in order to allow for the continued passage of fish into and out of the impoundment.

There are three active Ducks Unlimited sites within the watershed (Table 9.1).

Table 9.1 Ducks Unlimited Management Sites Within The Dunk — Wilmot Rivers Watershed Complex

DUCKS UNLIMITED MANAGEMENT SITES WITHIN THE DUNK - WILMOT WATERSHED COMPLEX

PROJECT	SIZE (ha)	SHORELINE (km)	YEAR COMPLETED
Afflecks	34	4.0	1975
Scales Pond	26	7.1	1978
Millars Pond	5	1.6	1986

10.0 ADDITIONAL ACTIVITIES WITHIN DUNK - WILMOT RIVERS WATERSHED COMPLEX

10.1 Hydrometric Stations

The first streamflow data collected in Prince Edward Island was from the Dunk River at Rogers Mill between 1919 and 1935. The station at Wall Road on the Dunk River (NAQUADAT No. 01CB002) is one of two stations on P.E.I. which have been in operation since 1961. There are two additional active stations located in the Dunk - Wilmot Rivers Watershed Complex (NAQUADAT Nos. 01CB004 and 01CB006) for which data to 1986 is available (Maps 11L/5 and 11L/6). Together, the

stations drain an area of 167.64 square kilometres.

Land use characteristics for the basins draining to each of these stations and others which are no longer active have been determined by the Inland Waters Directorate, Environment Canada, Dartmouth, Nova Scotia and appear in Table 10.1.

In addition, the Water Quality Branch, Inland Waters Directorate, Environment Canada, Moncton, New Brunswick also maintains somewhat limited data associated with the following studies:

- P.E.I. Groundwater Study (May 1972 - September 1973);
- P.E.I. Surface Water Quality Survey (July 1972);
- Water Quality Board National Water Quality Monitoring (April 1974 - March 1978); and the
- Toxic Chemical Survey (1985).

Parameters monitored included the following: major ions, physical parameters, nutrients, metals and toxic substances.

11.0 ACTIVITIES AFFECTING SURFACE WATER RESOURCES WITHIN THE DUNK - WILMOT RIVERS WATERSHED COMPLEX

Many of the problems affecting surface water resources within the Dunk - Wilmot Rivers Watershed Complex occur as a result of the high erodibility of Island soils. Soil erosion is accelerated by poor agricultural, forestry and road maintenance and construction practices. The problems affecting surface water resources on P.E.I. can be placed into three general categories: sedimentation (siltation) sources, pollution point sources and instream obstructions.

11.1 Sedimentation (Siltation) Sources

The entry of soil into surface waterways is described by the Watershed Inventory Project as a siltation (sedimentation) source. Autumn tillage, particularly plowing with the slope and cultivation excessively close to the streams' edge, often results in extensive landwash and siltation of the Island's waterways. Improper forestry operations, such as clearcutting on steep slopes and removal of greenbelts along streams and rivers also provides for sedimentation of streams and rivers.

One of the major sources of siltation to Island waterways is caused by the construction and maintenance of P.E.I. roads. Many roads on the Island are unpaved which presents numerous potential sources of sedimentation. Improper grading of these roads, in particular, leaving a ridge of clay and sand at either edge allows runoff water to form channels causing erosion to the road surface. Water usually flows alongside these ridges until it "breaks" through, usually at a road-stream intersection. This practice of

Table 10.1 Land Use Characteristics of Hydrometric Stations Located Within Dunk — Wilmot Rivers Watershed Complex

Station Number	Drainage Area (km^2)	Forest Area (km^2)	Cleared Area (km^2)	Swamp Area (km^2)	Pond Area (km^2)	Basin Perimeter (km)	Total Length of Stream (km)	Stream Gradient (%)	Period of Record
01CB001	99.81	28.00	71.50	0.05	0.26	46.40	98.10	0.29	1919-1933
01CB002*	114.99	30.10	84.50	0.13	0.26	50.90	101.00	0.27	1961-PRESENT
01CB004*	45.85	6.30	39.60	0.06	0.08	33.83	51.30	0.36	1972-PRESENT
01CB005	12.90	1.30	11.40	0.08	0.064	16.90	11.90	0.44	1971-1987
01CB006*	5.60	1.20	4.40	0.0	0.001	9.53	6.30	0.68	1974-PRESENT
01CB007	10.90	4.20	6.70	0.0	0.02	13.50	9.30	1.11	1974-1975
01CB008	20.00	10.00	9.90	0.01	0.018	19.50	19.80	0.88	1974-1975
01CB009	53.30	19.80	33.50	0.02	0.044	33.70	48.10	0.51	1974-1975
01CB010	16.30	4.10	12.10	0.01	0.001	17.80	19.40	0.89	1974-1975
01CB011	80.70	25.60	55.00	0.03	0.046	41.00	79.90	0.37	1974
01CB012	8.20	0.70	7.50	0.02	0.00	12.50	7.90	0.75	1974-1975
01CB013	99.60	27.90	71.40	0.05	0.256	45.90	97.80	0.34	1974
01CB014	23.50	8.20	15.30	0.002	0.013	24.80	18.20	0.38	1974-1975

* ACTIVE

grading also renders ditches, if present, useless.

Silt-loading of Island streams and rivers does not usually affect the waterway at the point of entry but its effects are impacted further downstream. Soil particles are carried by currents and deposited in the stream covering essential finfish spawning areas. As well, shellfish beds within the estuaries at the mouth of the rivers and streams are adversely affected in that they are smothered by the silt that has originated from upstream locations.

11.1.1 South Freetown I

All vegetation in a field (Map 11L/5) has been cleared to the edge of the stream. The long gradual slope to the water's edge and the fact that the field will be barren during the spring when 80% of soil erosion on P.E.I. occurs (Edwards, 1988) indicates that this is a major siltation source. Numerous other fields are farmed in the same fashion throughout the Dunk - Wilmot Rivers Watershed Complex, thereby multiplying the rate of siltation many times.

11.1.2 South Freetown II

Recent land clearing and the removal of the greenbelt was noted at this location (Map 11L/5) thereby posing a potential problem as a landwash and siltation site if vegetation is not re-established.

11.1.3 Newton

A large shale pit (Map 11L/5) located adjacent to Route #111 borders an upper tributary of the Dunk River. Extensive clearing and leveling has occurred with clay being bulldozed to a steep bank within a few metres of the streambank. No bank stabilization was undertaken and soil erosion was evident. The potential for future sedimentation and chemical contamination exists as this site has been established as a "home base" for a mobile asphalt plant.

11.1.4 Rose Valley

Cattle were observed watering from a tributary of the Dunk River which traverses a pasture (Map 11L/6). Bank destabilization was not too severe since there are a relatively small number of cattle within the operation.

11.1.5 Shamrock

Extensive pitting and bank destabilization caused by stock watering is occurring to the Dunk River (Map 11L/5).

11.1.6 Stanchel I

Extensive streambed damage caused by watering cattle is

evident in a feedlot (Map 11L/6) in Stanchel. Further downstream (Map 11L/6) brush from a clearcut is piled into a stream and on the bank. Together, they represent a siltation source, a partial barrier to fish passage and a source of bacterial contamination.

11.1.7 Stanchel II

This stock watering site exhibits extensive pitting of the streambank on the Dunk River (Map 11L/6).

11.1.8 Wilmot Valley

Spring runoff from a dirt road (Map 11L/5) was noted to create extensive siltbed formation in the Wilmot River.

11.2 Pollution Point Sources

The entry of non-natural substances into a surface waterway is known as a pollution point source. For example, fertilizer and manure runoff into surface waterways results in bacterial and chemical contamination of the system. Inadequately or improperly treated human sewage, stormwater drainage and the discharge of industrial effluents also contributes to the deterioration of P.E.I.'s surface water quality.

The most recent examples of pollution point sources on the Island have been the entry of petroleum products, specifically gasoline, into streams, rivers and groundwater aquifers. This has resulted from either transportation accidents or leakage from underground storage tanks.

In many cases, the result of these pollution point sources is the eutrophication of the aquatic system. As is the case with siltation the effects of many pollution point sources are felt in downstream areas. This can result in the closure of shellfish harvesting areas.

11.2.1 Ross Corner

Liquid manure from a poultry operation (Map 11L/5) flows down a driveway ditch then travels several hundred metres along a ditch on Highway #8 and pools. During dry weather it evaporates or is absorbed into the ground. However, during wet periods its leachate flows into a tributary of the Dunk River. This situation constitutes a human health hazard in addition to bacterial contamination of the water.

11.2.2 Glen Valley

Manure piles are located on steep slopes (Map 11L/6) above a stream with the associated runoff contributing to bacterial contamination of the upper reaches of the Dunk River. In addition, cattle have access to approximately one

hundred (100) metres of the stream flowing through a pasture and resulted in destabilized banks.

11.3 Instream Obstructions

Numerous other factors also influence the quality of waterways within the Dunk - Wilmot Rivers Watershed Complex. Fallen trees or other debris in the streams and rivers present problems for fish passage. Improperly installed and unnmaintained culverts, insufficient water flow and non-existent or inadequate dam bypass structures not only pose barriers to successful fish passage but also affect the amount of water available for use in downstream areas by other proponents.

11.3.1 Bedeque

This site (Map 11L/5) constitutes a complete barrier to fish passage on the Dunk River. The dam incorporates a stoplog structure and two spillways (1.00 and 1.50 metres each) to the stream below. The accompanying pond is a favored fishing spot and may warrant a fishway.

11.3.2 South Freetown I

Land clearing has resulted in brush, stumps and other natural debris being pushed into the Dunk River at the southern end of Scales Pond (Map 11L/5).

11.3.3 South Freetown II

Blowdown of several trees has resulted in a partial barrier (Map 11L/5) to fish passage on the Dunk River. Surface navigation through this debris is not possible.

11.3.4 South Freetown III

Blowdown of trees and downstream movement during high water levels has resulted in complete blockage of the Dunk River (Map 11L/5).

11.3.5 Breadalbane

A complete barrier to fish passage exists where a drop-inlet (Map 11L/5) passes water from a pond. A vertical drop of more than 1.0 metre prohibits any possibility of fish migration beyond this point on the Dunk River.

11.3.6 Emerald

This is the location of an Environment Canada stream guaging station (Map 11L/5). A steel "V" barrier in the stream causes a 0.45 to 0.61 metre drop to a concrete spillway. A plunge pool is located about 2.0 metres from the base of the waterfall. This obstacle constitutes a partial

barrier to fish passage on the Dunk River.

11.3.7 Elliots Pond

A man-made structure (Map 11L/6), which appears to be a foot bridge, constitutes a complete barrier to fish passage. Stock watering was also noted at this site on the Dunk River.

11.3.8 Glen Valley

At Glen Valley, where a road crosses the Dunk River (Map 11L/6), two 1.50 metre culverts restrict water flow. One constitutes a complete barrier to fish passage while the other is a partial barrier.

11.3.9 Reads Corner I

Water depth in the bypass channel of a small pond on the Wilmot River (Map 11L/5) is very shallow. The bottom is strewn with concrete blocks. If fish are present in this waterway the bypass would constitute a partial barrier to them.

11.3.10 Reads Corner II

This site (Map 11L/5) constitutes a partial barrier to fish passage under low water conditions. Some erosion around the culvert was also noted in the section of the Wilmot River.

11.3.11 Morboro

This section of the Wilmot River, especially below the pond (Map 11L/5), is badly choked with alder and willow growth. If fish use this stream it is unlikely that they could navigate this stretch. The pond's bypass channel is suitable for passing fish.

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APPENDIX

DAM INSPECTIONS IN DUNK-WILMOT WATERSHED

READS CORNER I 442500-5138500

Bypass channel with depth less than 0.10 meters creates a partial to complete barrier. Bottom strewn with rocks and concrete blocks.

READS CORNER II 442500-5138900

A 0.75 meter culvert under farm lane is stabilized by broken pieces of concrete. There is leakage around downstream end of culvert with a 0.25 meter drop to stream level. The pool depth of 0.35 meters should be okay for fish passage.

BEDEQUE I 443800-5131700

No pond found here. Fish habitat above and below this road-crossing is non-existent. The small shallow stream is overgrown with alders.

BEDEQUE II 444100-5130200

Breached. Only a small shallow stream at this location.

BEDEQUE III 443900-5129900

Small bypass pond. Channel is shallow and steeply sloped. If fish used the pond the channel would be a complete barrier.

SEARLETOWN 447100-5127800

A wet meadow with no pond was observed at this site. Very small stream is not suitable fish habitat.

LEARDS POND 446600-5129200

Large pond with a stop log water control structure. There is a 1.0 meter drop to spillway.

SOUTH FREETOWN 454800-5133900

A small farm pond with bypass channel that is overgrown with alders and other vegetation forms a complete barrier to fish travel.

MARCHBANKS POND 446600-5138000

Large bypass pond does not create any problems for fish passage.

NORBORO I 455700-5139900

Small bypass pond with channel is okay for fish passage should they be able to navigate the heavily vagetated sections of downstream areas.

NORBORO II 454900-5137700

There is neither a pond or stream at this location.

SPRINGFIELD I 458900-5137300

There was not a visible stream at this site, only a wet meadow.

SPRINGFIELD II 458700-5137400

Only a wet meadow was visible at this site.

EMERALD 457000-5133900

An Environment Canada stream gauging station is located at this site. A 0.75 meter drop to a concrete stone spillway with no pool creates a complete barrier to fish passage.

NEWTON I 457600-5131700

A 2.50 meter corrugated steel culvert has 1.00 meter water depth thereby posing no difficulty for fish passage.

NEWTON II 457600-5132000

This highway crossing does not prohibit fish from passing through although the down stream section is choked with alder and may cause problems.

STANCHEL 464300-5129100

Bypass channel of this moderately sized pond is no barrier to fish.

ROSE VALLEY 463000-5129300

A water depth of 0.12 meters may prohibit fish from passing beyond this site (wooden planked culvert).

BREADALBANE POND 461300-5133500

Nine-step pool and weir fishway. It is a relatively new wooden structure in good condition.

MILLERS POND 464300-5134300

Seven-step pool and weir fishway.

SCALES POND 453100-5132200

Sixteen-step pool and weir fishway.